

**Table B-13**  
**USAREUR/Seventh Army—Continued**

Installation (activity) and location	UIC	EMM (DA Pam 738-750)
Pirmasens	W33G01	H, J, K, N, P, Q, S, T, U, V, W, X, Y, Z
Schinnen (SHAPE)	WCA099	H, J, K, N, P, Q, S, T, U, V, W, X, Y, Z
Worms	W33M01	H, J, K, N, P, Q, S, T, U, V, W, X, Y, Z
Zweibrucken	W33P01	H, J, K, N, P, Q, S, T, U, V, W, X, Y, Z
<b>U.S. Army Southern European Task Force</b>		
Leghorn	WCSM7A	B, H, J, K, N, P, Q, S, T, U, V, W, X, Y, Z
Vicenza	W4CT13	H, J, K, N, P, Q, S, T, U, V, W, X, Y, Z
<b>26th Support Command</b>		
Heidelberg	W32801	H, J, K, N, P, Q, S, T, U, V, W, X, Y, Z
U.S. Army Berlin	W1Y47A	D, E, F, G, H, J, K, N, P, Q, S, T, U, V, W, X, Y, Z

**Table B-14**  
**USARPAC**

Installation (activity) and location	UIC	EMM (DA Pam 738-750)
DOM, 17th Area Support Group	WDCA99	H, J, L, M, N, P, Q, S, T, U, V, W, X, Y, Z
78th Aviation Bn	W3NDAA	A
35th Supply and Services Bn	WCA699	E, O
83d Ordnance Bn	WB0399	R
DOM, 10th Area Support Group	WERG99	H, L, N, P, Q, S, T, U, V, W, X, Z
U.S. Army Support Command, Hawaii, Fort Shafter, HI	W3RBAA	D, E, F, H, J, K, L, N, P, Q, S, T, U, V, W, X, Y, Z
Fort Richardson, AK	WOVKAA	D, E, F, G, H, J, K, N, P, Q, S, T, U, V, W, X, Y, Z
Fort Wainwright, AK	WOVKAA	D, E, F, G, H, J, K, N, P, Q, S, T, U, V, W, X, Z

**Table B-15**  
**USARSO**

Installation (activity) and location	UIC	EMM (DA Pam 738-750)
DOL, 41st Area Support Group, (ASG) Corozal, PM	WJB899	D, E, G, H, J, K, N, P, Q, S, T, U, V, W, X
DOL, 41st ASG, Dock 45, Fort Davis, PM	WJB899	L
DOL, 41st ASG, Fort Davis, PM	WJB899	V

**Table B-16**  
**Equipment Maintenance Mission Codes**

Code	Description	Code	Description	Code	Description
A	Aircraft	K	Electronic test equipment	T	Machine tools
B	Air defense systems	L	Floating Equipment	U	Shop support equipment
C	Missile systems surface-to-surface	M	Railway equipment	V	Non-tactical vehicles
D	Artillery weapons	N	Construction equipment	W	Furniture and appliances
E	Small arms	O	Medical and dental equipment	X	Office equipment
F	Tanks	P	Materiel handling equipment	Y	Tools not elsewhere classified
G	Combat Vehicles	Q	Support equipment	Z	Equipment not listed elsewhere
H	Tactical vehicles	R	Ammunition and ammunition equipment		
J	Communication and Electronic equipment	S	Installation and depot-peculiar service equipment		

## Appendix C

### Maintenance Performance Measures

#### C-1. General

The performance measures discussed in the paragraphs below were developed to assist the unit commander and maintenance shop officer in evaluating critical maintenance operations and in determining overall performance. In accordance with paragraph 4-13, the computation and reporting of utilization rates is mandatory if the information system to collect data, perform trend analyses, and provide

the performance reports is automated, and optional if manual. All other performance measures are optional. The optional performance measures will not be used for inspection purposes.

#### C-2. Utilization rate

a. There are two utilization rates that are used to measure the effective use of mechanics. The assigned utilization rate measures the percent of direct labor man-hours assigned to the unit recorded as productive man-hours on DA Forms 2407 and 5504. The available utilization rate measures the percent of direct labor man-hours

made available to the shop office for work recorded as productive man-hours on DA Forms 2407 and 5504.

b. Direct labor is work performed by assigned personnel that directly contributes to the repair of equipment.

c. Indirect labor is work performed by assigned personnel that contributes to the completion of work orders but does not include the performance of repairs.

d. Productive time is the sum of direct and indirect labor time.

e. Assigned direct labor personnel includes all civilians and soldiers whose primary duties require they spend more than 50 percent of their time performing repairs.

f. Assigned indirect labor personnel are civilians and soldiers whose primary duties require they spend 50 percent or less of their time performing repairs.

g. Assigned direct and indirect labor man-hours is computed as the number of assigned direct labor personnel times 8 hours per work day times the number of work days in the reporting period.

h. Available direct and indirect labor man-hours are the assigned direct and indirect labor man-hours less those non-productive man-hours in the following categories:

- (1) Military training (non maintenance skill training).
- (2) Alert duty.
- (3) Organizational duties.
- (4) Flight status.
- (5) Personnel processing.
- (6) TDY.
- (7) Compensatory time off.
- (8) Excused from duty.
- (9) Ordinary leave.
- (10) Sick leave (civilian).
- (11) Medical absence (military).
- (12) Personal affairs.
- (13) AWOL/confined.
- (14) Leave without pay.
- (15) Job related injury.
- (16) Administrative leave.

i. Overtime is that time worked beyond the normal 8 hour day. Overtime will be added to the assigned and available labor man-hours to ensure the total productive man-hours are accounted for in the utilization rate.

j. Table C-1 is an example of how to compute man-hour utilization manually.

k. Table C-2 is an example of a report format that shows separate percentages for direct, indirect, and non-productive man-hours.

l. An assigned man-hour utilization rate formula is shown below:

$$\text{utilization rate} = \frac{\text{Assigned man-hour}}{\text{Personnel Man-hours}} \times 100 \text{ Assigned DL}$$

m. An available man-hour utilization rate formula is shown below:

$$\text{utilization rate} = \frac{\text{Available man-hour}}{\text{Personnel Man-hours}} \times 100 \text{ Available DL}$$

### C-3. Materiel readiness rate

DS and GS maintenance organizations may measure the ultimate successful accomplishment of their mission against the materiel readiness of the equipment they support. As a measure of maintenance performance, however, the materiel readiness rate gives only an indication of the possible presence or absence of problem situations. The indication must be followed up to reach a logical conclusion.

### C-4. Workload

Workload is the sum of the estimated man-hours required for work awaiting induction and to complete work in progress. Established time standards for tasks performed on a repetitive basis will result in more accurate man-hour estimates. The task time standards should

be reviewed and adjusted at least semiannually. An increasing trend in workload might indicate—

a. Additional quantities added to the density list.

b. Newer equipment requiring greater annual maintenance man-hours.

c. Acceptance of work orders that include tasks authorized for performance at lower or higher levels of maintenance.

d. Increased work order requests due to increased supported unit training.

### C-5. Direct labor availability

Direct labor availability is the number of man-hours available per day to perform maintenance tasks, such as, the productive capacity of the organization. If a review of projected personnel gains and losses 90 days to 180 days out indicates an adverse situation is developing, the following alternatives should be addressed:

a. Expediting the personnel replacement process.

b. Borrowing personnel from other organizations.

c. Using local contract or host nation support.

d. Shifting a portion of the workload to another organization that has excess productive capacity.

### C-6. Efficiency rate

a. The efficiency rate is a measure of the skill proficiency within the maintenance organization. It is totally dependent upon establishment and maintenance of a set of task time standards that are representative of maintenance performance under the local situation. Inspectors will use the task time standards to estimate the man-hours required to complete each work order.

b. The efficiency rate is the man-hours estimated for a given work order (or the total of estimated man-hours for all work orders completed during a given period of time) divided by the man-hours that were actually expended to accomplish the work orders.

c. The recommended management objective for the efficiency rate is 80 to 100 percent.

d. The efficiency rate will be calculated for the unit by including all of the work orders completed during the reporting period. It will be calculated for specific individuals on an "as required" basis to measure skill proficiency and thus identify training requirements.

e. The trend of the efficiency rate should be plotted for the previous 12 months. When a declining trend is observed, the following should be considered:

(1) Review the maintenance task standards for validity.

(2) Verify the effectiveness of supervision within the shops.

(3) Review the supported density list to identify new equipment for which MOS training may be required.

(4) Identify individuals who require additional training in certain skills or on certain equipment.

(5) Physical layout.

(6) Tool and TMDE availability.

(7) Amount of lag time spent waiting for tools and parts.

### C-7. Backlog

a. Backlog is the overall measure of the direct labor resources required in terms of the number of days that would be required to accomplish the existing workload with available direct labor and with current utilization and efficiency rates and without regard to repair parts availability. The formula for backlog computation is as follows:

W

$$\text{Backlog (in work days)} = \frac{W}{A \times U \times E}$$

Where:

W=workload

A=direct labor availability

U=direct labor utilization rate

E=efficiency rate

b. The standard for backlog should be established at the local level based on the equipment supported and historical experience.

The previous 12 months experience should be analyzed for trends. If an unfavorable trend emerges, the components of the backlog formula should be analyzed to identify the probable cause.

#### **C-8. Turnaround time**

a. Turnaround time is the overall measure of the duration of the maintenance cycle. It gives an indication of the responsiveness of the maintenance organization to its customers. Turnaround time should be computed by commodity and exclude initial rejects. It covers the period of time from acceptance of a work order to closeout. It does not include time awaiting customer pickup.

b. Turnaround time will be determined as follows:

(1) Identify the number of calendar days between acceptance and closeout for each work order completed during the period.

(2) Arrange the work orders in ascending order based upon the number of calendar days.

(3) Remove from consideration the 25 percent of the total number of work orders with the highest number of calendar days.

(4) Calculate the average of calendar days for the remaining work orders.

c. The 25 percent of work orders with long times should be the subject of intensive individual attention to resolve their particular problems, but should not be allowed to distort the average of turnaround time that is intended to be representative of normal operations.

d. Turnaround time involves the following three major components: maintenance delay time, supply delay time, and repair cycle time. Although the factors that comprise or influence these components are not always controllable, no corrective actions can be taken until the problems have been identified and traced to the probable cause. Maintenance shop officers are responsible for correcting those factors which they can control and for bringing to the attention of the chain of command those factors beyond their control.

e. Commanders at the local installation level should establish a standard for the turnaround time measure. The trend of the turnaround time and its major components should be plotted for the previous 12 months. When an increasing trend is observed, the major components of turnaround time should be reviewed and analyzed as indicated in the following paragraphs.

#### **C-9. Maintenance delay time**

a. Maintenance delay time is the component of turnaround time that represents time spent awaiting a required resource other than repair parts; that is the availability of facility space, tools, TMDE, and skilled personnel. It includes time awaiting initial, in-process, and final inspections, and time awaiting induction into the shop.

b. Maintenance delay time is calculated using the same segment of work orders completed during the period as used to calculate turnaround time. It is determined by calculating the mean number of calendar days that work orders in the segment were carried in status codes indicating awaiting inspection, awaiting shop, or awaiting some action other than receipt of repair parts. It will also be expressed as a percentage of the total turnaround time.

c. Local commanders should establish a standard for maintenance delay time in terms of its percentage of total turnaround time. When an increasing trend is observed, the following should be reviewed:

- (1) Availability and utilization of direct labor personnel.
- (2) Inspection procedures.
- (3) The ratio of direct labor personnel to work stations by shop section; balance labor among work stations.
- (4) The adequacy of the quantity of tools and TMDE.
- (5) The adequacy of lift and materiel handling equipment.

#### **C-10. Supply delay time**

a. Supply delay time is the component of turnaround time that represents time lost waiting for receipt of repair parts. It includes only that time when no further maintenance action can be taken due to a lack of repair parts. Time elapsed while repair parts are on order but other maintenance actions are, or could be, taken will not be counted as supply delay time.

b. Supply delay time is calculated using the turnaround time segment of work orders completed during the period. It is determined by calculating the average number of calendar days that work orders in the segment were carried in status codes indicating no further action possible while awaiting receipt of repair parts. It is also expressed as a percentage of the total turnaround time.

c. The standard for supply delay time should be established by the local commander in terms of its percentage of total turnaround time.

d. When an increasing trend is observed, the following should be reviewed:

- (1) Requisition priorities.
- (2) Reconciliation procedures.
- (3) Authorized stockage list.
- (4) Supply performance measures, including—
  - (a) Gross availability or fill rate.
  - (b) Average customer wait time.
- (5) Requisition processing time.
- (6) Receipt processing time.

#### **C-11. Repair cycle time**

a. Repair cycle time is the component of turnaround time that represents time spent in the shop undergoing inspection, repair, or service. It is the primary component that measures actual maintenance performance rather than detractors to performance as measured by the two delay time components. Repair cycle time is comprised of, or influenced by, several factors that are addressed separately below.

b. Because it is the only delay component that is subject to distortion by a small percentage of the total, the repair cycle time will be calculated using all of the work orders completed during the period. It will be determined by calculating the average number of calendar days that work orders were carried in status codes indicating "in shop."

c. Installation level commanders should establish standards for total repair cycle time, by priority of the work order. When an increasing trend is observed, the factors affecting repair cycle time should be reviewed and analyzed as indicated below.

#### **C-12. Backup support utilization**

a. Backup support utilization is a measure of the extent of workload transferred to an organization charged with the responsibility of absorbing overflow workload.

b. Backup support utilization is a percentage calculated by dividing the number of man-hours estimated for all work orders accepted into the maintenance activity during the period into the number of man-hours estimated for work orders evacuated to backup support during the same period.

c. The standard for backup support utilization should be established by the installation commander. The installation commander should consider the unit's capacity as stated in its MTOE. When an increasing trend is observed, the following items should be reviewed:

- (1) The trend of workload acceptance to identify an increase in work coming in from supported units.
- (2) The supported density lists to identify additional quantities supported.
- (3) Direct labor availability to identify a decrease in labor capacity.
- (4) Direct labor utilization rate to identify a decrease in effective use of personnel resources.

#### **C-13. Maintenance float utilization**

a. *Transaction time.*

(1) Maintenance float transaction time measures a factor that impacts upon repair cycle time and the efficiency of the maintenance float decision process.

(2) Maintenance float transaction time is determined by calculating for the previous 12 months an average of the number of calendar days between the acceptance of the work order into the support maintenance activity and the customer receipt of the float.

(3) The standard for maintenance float transaction time should be established by the local installation commander. When an increasing trend is observed, the following items should be reviewed:

(a) The float decision process to ensure that the decision to float is made as early as possible.

(b) The availability of float assets to identify underutilized items or shortages.

(c) The demand recording process to ensure that demands are being captured.

(d) The priority placed on work orders to repair float assets to ensure that it matches the highest priority of supported units authorized these items.

*b. Float utilization.*

(1) Float utilization is computed as the number of work orders closed out using float divided by the total number of work orders less initial rejections.

(2) If you are not using the float, this factor will be low and should trigger management action to evaluate if equipment maintained as float should be retained.

#### C-14. Rejection rate

a. The rejection rate is the number of items being reinducted into the shop for rework. This includes in-shop and final inspection

rejections and customer rejections and returns for correction of the same problem within 30 days after closeout of the work order.

b. The rejection rate standard should be established by the local commander.

c. If the in-shop rejection rate exceeds the standard, the shop officer should—

(1) Validate the inspection.

(2) Determine adequacy of leadership and supervision within the shops.

(3) Determine if procedures are correct. If not, submit recommended changes to TMs.

(4) Determine if new equipment or basic skills training is required.

(5) Determine if facilities are adequate.

d. If the customer rejection or return rate exceeds the standard, the shop officer should—

(1) Validate the inspection standards and skills.

(2) Determine if additional new equipment or basic skills training is required.

(3) Determine if repeated faults are a result of improper operation or unit maintenance.

(4) Determine if customer relations are the cause of the increased rejection rate.

**Table C-1**  
**Unit commander's computation of utilization rate using assigned personnel**

Day	Assigned Personnel	M/H Assigned Normal 8 Hour Day	Overtime Hours	Total Assigned Man Hours
1	10	80	0	80
2	9	72	0	72
3	11	88	0	88
4	11	88	0	88
5	12	96	48	146
6	12	96	48	146
7	13	104	26	130
8	10	80	0	80
9	10	80	0	80
10	12	96	0	96
Total Direct Labor Man-Hours Assigned				1002

Notes:

<sup>1</sup> Computation of Total Direct Labor Man-hours Assigned.

<sup>2</sup> Total direct and indirect labor man-hours reported for the 10 day report period on DA Forms 2407 and 5504 is 340.

<sup>3</sup> Using the formula in paragraph C-2 the utilization rate is computed as:  
Utilization Rate =  $340 \div 1002 \times 100 = 34\%$

**Table C-2**  
**Assigned and Available Man-hour utilization report sample Unit: B Btry, 2/60**

1 Assigned Man-Hours	Direct Man-hours	%	Indirect Man-hours	%	Non-Productive Man-hours	%
40	20	50	10	25	10	25%

Notes:

<sup>1</sup> Assigned man-hours—Enter the number of man-hours assigned for productive direct labor during a specified time period, based on a locally established work schedule day multiplied by the number of direct labor personnel assigned.

<sup>2</sup> Available man-hours—Enter the number of man-hours available for productive direct labor during the reporting period. The available man-hours represent the time the direct labor personnel spend in the maintenance facility available to perform maintenance.

<sup>3</sup> Direct man-hours—Enter the number of man-hours actually expended during the specified time period for hands-on maintenance tasks.

<sup>4</sup> Percentage—Divide direct man-hours by assigned man-hours and enter the result.

<sup>5</sup> Indirect man-hours—Enter the number of man-hours actually expended during the specified time period providing productive support for the accomplishment of direct labor.

<sup>6</sup> Percentage—Divide indirect man-hours by assigned man-hours and enter the result.

<sup>7</sup> Nonproductive man-hours—Enter the number of man-hours actually expended during the specified time period which did not provide support for the accomplishment of direct labor.

<sup>8</sup> Percentage—Divide nonproductive man-hours by assigned man-hours and enter the result.

<sup>9</sup> 1 Available man-hour utilization can be reported using the same format by substituting available man-hours where assigned man-hours appears.